

Name _____

Job _____

Group Members _____

Classification of Matter

All matter is constructed of atoms. They are the basic building blocks for everything around you. By combining atoms in different ways, you get different matter with different properties. This activity will help you understand the three types of matter- **elements**, **compounds**, and **mixtures**. In the set of bags you received, each bead represents a type of **atom**. Beads grouped together with string create a **molecule** (atoms bonded together).

Compare the codes listed on each bag to the objects inside.

1. What do the letters R, B, G, Pu, and Pi in the codes represent?

2. What do the small numbers (subscripts) in the codes represent?

3. Matter is classified as a **pure substance** when the particles have a definite chemical composition and cannot be separated into other substances by any mechanical process. Matter is classified as a **mixture** if the particles are a combination of two or more different materials that are not chemically combined (not all bonded together). Sort the bags into those that are pure and those that are mixtures. You should have **six pure substances** and **three mixtures**. List their codes here.

Pure Substances (6)

Mixtures (3)

4. Pure substances can be further classified into elements and compounds. **Elements** are defined as substances made from only one type of atom. **Compounds** are defined as substances made from two or more different types of atoms combined. Sort the bags from your pure substances category into elements or compounds, and list their codes here. You should have **three elements** and **three compounds**.

Elements (3)

Compounds (3)

5. Draw pictures using colored pencils to represent each type of matter. This is to help you remember what was in each bag.

Elements			
Compounds			
Mixtures			

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6. Which category of substances (elements, compounds, or mixtures) can be separated into two or more pure substances using physical separation (no bonds need to break)?

7. Which category of substances (elements, compounds, or mixtures) can be separated into two or more pure substances using chemical separation (bonds need to break)?

The next couple of questions will ask you to look at the codes (or chemical formulas) for the three types of matter. In answering these questions, consider how many letters the codes have, capital vs. lowercase letters, when subscripts are used, and when “&” symbols are used.

8. Refer to the codes listed in question #3. How are mixture codes different from pure substance codes?

9. Refer to the codes listed in question #4. How are the compound codes different from the element codes?

Elements		Compounds		Mixtures	
Carbon	C	Water	H ₂ O	Salt Water	NaCl & H ₂ O
Hydrogen	H ₂	Carbon dioxide	CO ₂	Milk	C ₆ H ₁₂ O ₆ & H ₂ O & C ₅₀ H ₁₀₂ O ₃ ...
Chlorine	Cl ₂	Sugar	C ₆ H ₁₂ O ₆		
Argon	Ar	Epson Salts	MgSO ₄		
Gold	Au	Glass	SiO ₂	Granite	SiO ₂ & KAlSi ₃ O ₃ & K ₃ Si ₃ O ₁₀ ...
Sodium	Na	Battery Acid	H ₂ SO ₄		
Oxygen	O ₂	Salt	NaCl		
Nitrogen	N ₂	Drain Cleaner	NaOH		
Phosphorus	P ₄	Copper Sulfate	CuSO ₄	Air	N ₂ & O ₂ & Ar & CO ₂ ...

10. Look at the list of matter above and the chemical formulas that chemists use to represent them. Write some rules for how chemical formulas are written. (How is an element's chemical formula different than a compound's? How is a compound's formula different than a mixture's? ETC.)